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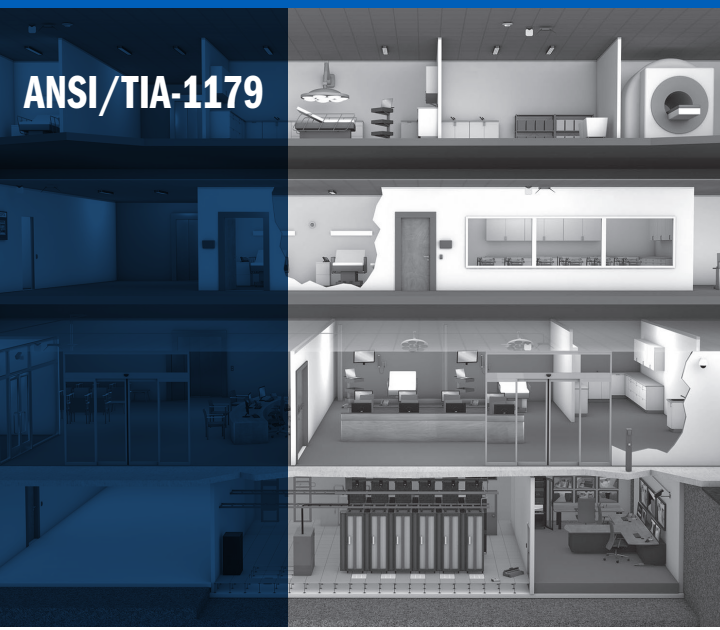

STANDARDS REFERENCE GUIDE

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Anixter is a leading global supplier of communications and security products and electrical and electronic wire and cable. We help our customers specify solutions and make informed purchasing decisions around technology, applications and relevant standards. Throughout the world, we provide innovative supply chain management solutions to reduce our customers' total cost of production and implementation.

Within the healthcare industry, we help hospitals enhance the quality of their care and safety by making major improvements to their communication, network and security systems that support their transformative technologies, approaches and processes.

PURPOSE OF INDUSTRY STANDARDS

- Provides guidance on the installation, maintenance and testing of products and technologies for the unique environments within a healthcare environment
- Supports mission-critical applications, creates operational efficiencies and increases productivity for the data and communications systems for patients, doctors, nurses and staff
- Allows for open-architecture systems that promote multimanufacturer environments that enable organizations to freely choose the solutions that best fit future interoperability needs
- Reflects recommended best practices to support a variety of existing and future systems to extend the life span of the infrastructure and improve critical uptime in a healthcare facility
- Allows organizations to fully experience their benefits on overall network performance

SCOPE OF THIS GUIDE

This document is meant as a reference that highlights the key points of the ANSI/TIA-1179 standards.

It is not intended as a substitute for the original document. For further information on any topic in the guide, refer to the actual standard. See the section called “Reference Documents” for instructions on how to order a copy of the standard itself.

ABBREVIATION REFERENCES

ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CSA	Canadian Standards Association
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical & Electronics Engineers
ISO	International Organization for Standardization
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
TIA	Telecommunications Industry Association

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ANSI/TIA-1179

PURPOSE OF THE ANSI/TIA-1179 HEALTHCARE FACILITY TELECOMMUNICATIONS INFRASTRUCTURE STANDARD

- Enables the planning and installation of a structured cabling system for healthcare facilities and buildings
- Establishes performance and technical criteria for various cabling system configurations for accessing and connecting their respective elements.

Healthcare organizations have a diversity of services available to them and are constantly adding new services. When applying specific applications to these cabling systems, consult application standards, regulations, equipment manufacturers, system suppliers and service suppliers for applicability, limitations and ancillary requirements.

Note to the reader: This standard duplicates many, but not all, sections of the ANSI/TIA-568-C.0, C.1, C.2 and C.3 standards that are already covered in this Anixter Standards Reference Guide booklet. In the interest of conserving space and avoiding unnecessary duplication, this summary guide will focus on highlighting the unique aspects of the ANSI/TIA-1179 standard that are not covered in other standards. It will reference those other standards when necessary.

TELECOMMUNICATIONS CABLING SYSTEM STRUCTURE

This standard establishes a cabling system structure based on the generic cabling system structure in ANSI/TIA-568-C.0 (see Figure 6 on page 19 in the Anixter Standards Reference Guide for ANSI/TIA-568-C.1). Even though ANSI/TIA-1179 has elements that share the same name as those in ANSI/TIA-568-C.1, they are not necessarily the same physical elements for the healthcare facility telecommunications system.

SCOPE

This standard specifies:

- The telecommunications infrastructure for healthcare facilities (e.g., hospitals and clinics)
- Cabling, cabling topologies and cabling distances
- Pathways and spaces (e.g., size and location)
- Ancillary requirements.

In addition to telecommunications systems, this standard specifies cabling that is intended to support a wide range of clinical and nonclinical systems, including:

- RFID (radio frequency identification systems)
- BAS (building automation systems)
- Nurse calls
- Security
- Access control
- Pharmaceutical inventory.

ENTRANCE FACILITIES

The entrance facilities (EF) shall be designed and installed in accordance with the requirements of ANSI/TIA-569-B.

The EF shall:

- Be designed with multiple entrance points and route diversity
- Be sized to accommodate other systems (e.g., building automation systems, nurse calls, security, CATV, biomedical systems) when necessary.

If the EF room size is not large enough to accommodate these other systems, they shall be installed in the equipment room (ER) or in another ER dedicated for such applications.

Functions of Entrance Facilities

- The network demarcation point between the access providers (APs) and customer premises cabling may be part of the EF. The location of this point may be determined by federal or local regulations.
- Electrical protection devices for campus backbone cables and in some cases for antennas and AP cabling may be located in the EF. Electrical codes apply for electrical protection.
- Connections between building cabling and outside plant cables via splice or other means may be included in the EF.

EQUIPMENT ROOMS

- Equipment rooms shall be designed and provisioned according to the requirements in ANSI/TIA-569-B.
- In many cases, an equipment room is combined with the EF and contains AP service and other premise terminations.
- Equipment rooms shall provide a minimum of two diverse pathways between the ER and EF for critical-care areas that would be severely impacted by a loss of telecommunications services. These diverse pathways shall require a route-separation distance as great as practical.

TELECOMMUNICATIONS ROOMS AND TELECOMMUNICATIONS ENCLOSURES

- Telecommunications rooms and enclosures shall be designed in accordance with ANSI/TIA-569-B.
- TRs should not have nontelecommunications services (e.g., medical gases, fluids) routed within them.
- The TR should be larger than that suitable for an office-oriented commercial building due to the numerous telecommunications services present in healthcare facilities (e.g., nurse call, patient tracking). A TR size should be 12 m^2 (130 $ft.^2$) or larger.

Cross-Connections and Interconnections

Horizontal and backbone building cables shall be terminated on connecting hardware that meets the requirements of ANSI/TIA-568-C.2 (for balanced twisted-pair cable) or ANSI/TIA-568-C.3 (for optical fiber cable).

Centralized Optical Fiber Cabling

Centralized cabling shall meet the requirements of ANSI/TIA-568-C.0. (See Figure 5 on page 17 in the Anixter Standards Reference Guide.)

BACKBONE CABLING (CABLING SUBSYSTEM 2 AND CABLING SUBSYSTEM 3)

- The backbone cabling shall meet the requirements of ANSI/TIA-568-C.0 (Cabling Subsystems 2 and 3).
- It should be planned to accommodate future equipment needs, diverse user applications, ongoing maintenance, service changes, sustainability, flexibility and relocation.
- A minimum of two diverse-route backbone pathways and cables shall be provided to each TR or TE that serves critical care areas that may be severely impacted by a loss of access-provider services. Placing cable between HCs, as shown in Figure 6 on page 19, is one option that can be used to accomplish this.
- Diverse pathways should entail a route separation as great as practical.

Star Topology

Backbone cabling shall meet the hierarchical star-topology requirements of ANSI/TIA-568-C.0.

- There shall be no more than two hierarchical levels of cross-connects in the backbone cabling.

Centralized Optical Fiber Cabling

Centralized optical cabling is designed as an alternative to the optical cross-connect located in the TR or TE when deploying recognized optical fiber cabling to the work area (WA) from a centralized cross-connect (See Figure 5 on page 17 in the Anixter Standards Reference Guide for ANSI/TIA-568-C.1.)

Length

Cabling lengths are dependent upon the application and upon the specific media chosen (see ANSI/TIA-568-C.0 and the specific application standard).

Recognized Cabling

The transmission media, which shall be used individually or in combination in backbone cabling, are as follows:

- Use 100-ohm balanced twisted-pair cabling (ANSI/TIA-568-C.2); Category 6 or higher is recommended.
  - Category 6A is recommended for new installations.
  - For backbone cabling, Category 3 cabling should be limited to analog voice applications.
- Use multimode optical fiber cabling (ANSI/TIA-568-C.3); 850-nm laser-optimized 50/125 µm is recommended.
- Use single-mode optical fiber cabling (ANSI/TIA-568-C.3).

HORIZONTAL CABLING (CABLING SUBSYSTEM 1)

General

Horizontal cabling (See Figure 7 in the Anixter Standards Reference Guide for ANSI/TIA-568-C.1) includes horizontal cable, telecommunications outlet/connectors in the work area (WA), mechanical terminations and patch cords or jumpers located in a telecommunications room (TR) or telecommunications enclosure (TE), and may incorporate multiuser telecommunications outlet assemblies (MUTOAs).

- The pathways and spaces to support horizontal cabling shall be designed and installed in accordance with the requirements of ANSI/TIA-569-B.
- Application-specific electrical components, such as impedance-matching devices required by some networks or services, shall not be installed as part of the horizontal cabling. When needed they will be placed external to the telecommunications outlet/connector.

For healthcare applications, the meaning of the term “work area” must be expanded to include all the connectivity required by the various applications used in a healthcare environment to provide the appropriate level of services. After the initial installation, adding or changing horizontal cabling could result in a net decrease in the quality of care being provided, which jeopardizes infection control measures or compromises life safety measures. Due to the cost and impact of making changes after the initial installation, designers need to reduce or

eliminate the probability of requiring changes to the horizontal cabling as the user's requirements evolve (e.g., by installing cabling in pathways placed between areas so the cabling is easily accessed by maintenance personnel).

- The minimum number of permanent links shall be the number required to provide the needed cabling for each type of work area. (See "Work Area" in the next section.)
- Each balanced twisted-pair cable shall be terminated in an 8-position modular jack at the equipment outlet.
- The telecommunications outlet and connector for 100-ohm balanced twisted pair cable shall meet the requirements of ANSI/TIA-568-C.0.
- Optical fibers at the equipment outlet shall be terminated to a duplex optical fiber outlet and connector meeting the requirements of ANSI/TIA-568-C.3.

Topology

- The horizontal cabling shall be a star topology that meets the requirements of ANSI/TIA-568-C.0.
- Each WA outlet connector shall be connected to the horizontal cross-connect (HC).

Length

The horizontal cable length extends from the termination of the media at the HC in the TR or, when used, the TE to the telecommunications outlet/connector in the work area.

The maximum length should be:

- 90 m (295 ft.) for balanced twisted-pair horizontal cabling
- 90 m (295 ft.) for optical fiber backbone cabling except for some cases where the length may be increased according to the application and upon the specific media chosen (see annex D of ANSI/TIA-568-C.0)
- 5 m (16 ft.) for cross-connect jumpers and patch cords in cross-connect facilities.

For each horizontal channel, the total length allowed for cords in the WA, plus patch cords or jumpers and equipment cords, in the TR or TE shall not exceed 10 m (33 ft.) unless a MUTOA is used.

Recognized Cabling

Three types of media are recognized and recommended for use in the horizontal cabling system:

- 100-ohm balanced twisted-pair cabling: Category 5e or higher (ANSI/TIA-568-C.2); Category 6 or higher is recommended. Category 6A is recommended for new installations.
- Multimode optical fiber cabling (ANSI/TIA-568-C.3), 2-fiber or higher fiber count; 850 nm laser-optimized 50/125 µm is recommended.
- Single-mode optical fiber cabling (ANSI/TIA-568-C.3), 2-fiber or higher fiber count is recommended.

WORK AREA

General

The work area (WA) components extend from the telecommunications outlet and connector end of the horizontal cabling system to the WA equipment (e.g., phone, computer, wireless access point). The telecommunications outlet and connector shall meet the requirements of ANSI/TIA-568-C.0.

In healthcare applications, the work area takes on a broader scope as it is located in a multitude of application-specific areas and spaces within the healthcare facility. These areas are divided into the following classifications:

- Patient services
- Surgery, procedure and operating rooms
- Emergency
- Ambulatory care
- Women's health
- Diagnosis and treatment
- Caregiver
- Service and support
- Facilities
- Operations
- Critical care

Work Area Density

Table 51 shows the recommended telecommunications outlet and connector densities based on the classifications above and the function at that location. This table shows a representative list of application-specific areas found in healthcare facilities. The names and functions of the areas are not standards-based, so they may vary by facility. Each area classification is listed with representative related spaces and each space is listed with its associated "cabling services." The letters L, M or H refer to the relative cabling density of that work area location. If no other guidance is provided, the cabling designer should select a number between the midpoint and upper end of the range to determine the number of outlets in a particular work area location.

- L = Low: Two to six outlets in each area
- M = Medium: Six to 14 outlets in each area
- H = High: > 14 outlets in each area

A) Patient services							
Administration	Registration	Patient room	Family lounge	Waiting room	Nurses stations	Library	Consultation
M	**M**	**H**	**L**	**L**	**H**	**M**	**L**

B) Surgery/procedure/operating rooms							
Patient prep	Patient holding	Patient recovery	Sterile zone	Substerile zone	Intensive care rooms	Operating room	Anesthesia offices
M	**M**	**M**	**L**	**L**	**H**	**H**	**M**

C) Emergency				
Ambulance bay	Evaluation	Observation	Exam rooms	Procedure rooms
L	**M**	**H**	**M**	**H**

D) Ambulatory care						
Procedure rooms	Out-patient surgery rooms	Mammography	Biopsy	Exam rooms	X-ray	Patient holding
M	**H**	**M**	**L**	**M**	**L**	**L**

E) Women's Health				
Ultrasound	Lactation	Labor/delivery room	Infant bays	Nursery
M	**H**	**M**	**L**	**M**

Table 51 – Recommended work area outlet densities

F) Diagnostic and treatment					
Magnetic resonance imaging (MRI) & control room	Simulator & control room	Linear accelerator & control room	CT scanner & control room	Procedure rooms	Operating rooms
H	**H**	**H**	**H**	**H**	**H**
Fluoroscopy	Radiograph	X-ray	Radiation processing	Lab	
L	**L**	**L**	**L**	**L**	**H**

G) Caregiver				
Exam room	Clean utility	Soiled utility	Nourishment	Charting
M	**M**	**M**	**L**	**L**
Nurse station	Workroom	Galley	Read room	
H	**M**	**L**	**M**	

H) Service/support		
Blood bank area	Pharmacy area	Anesthesia area
M	**M**	**H**

I) Facilities				
Janitor closet	Electrical rooms	Communication/ technology rooms	Building utility rooms	Elevator machine rooms
L	**L**	**L**	**L**	**L**
Mechanical rooms	Security office command center	Fire command	Specialty storage (e.g. batteries, chemicals)	
L	**H**	**M**	**L**	

J) Operations					
Administration	General storage	Cafeteria	Food service	Locker rooms/ showers	Laundry
M	**L**	**L**	**M**	**L**	**L**
Central sterile	Lounge	On-call suite	Retail areas	Conference rooms	General office areas
M	**L**	**L**	**L**	**M**	**L**

K) Critical Care		
ICU	Neonatal ICU	Recovery
H	**H**	**H**

Table 51 – Continued

Work Area (WA) Cords

- Cords used in the WA shall meet the performance requirements of ANSI/TIA-568-C.2 or ANSI/TIA-568-C.3.

MULTIUSER TELECOMMUNICATIONS OUTLET ASSEMBLIES (MUTOAS)

MUTOAs can be used to provide flexible layouts for spaces that are frequently rearranged to meet changing requirements of the end-user.

- MUTOAs must meet the requirements of ANSI/TIA-568-C.1.
- See the Section "Open Office Cabling [MUTOA]" and Figure 8 in the Anixter Standards Reference Guide for ANSI/TIA-568-C.1.

Maximum Work Area Cord Lengths for MUTOAs

- Balanced twisted-pair cables used in the context of MUTOAs shall meet the requirements of ANSI/TIA-568-C.2.
- The maximum cord length of balanced twisted-pair WA cables used in the context of MUTOAs is as shown in Table 6 in the Anixter Standards Reference Guide for ANSI/TIA-568-C.1.
- Optical fiber work area cords used in the context of MUTOAs shall meet the requirements of ANSI/TIA-568-C.3. The maximum horizontal cabling length is not affected by the deployment of a MUTOA.

CABLING INSTALLATION REQUIREMENTS

- Installation requirements of ANSI/TIA-568-C.0 in addition to this standard shall be followed.
- Some locations in healthcare facilities may be sensitive to atmospheric contamination. Cabling products with specific attributes (e.g., filled or blocked cable, minimal off-gassing) may be required in these locations.
- Infection control requirements (ICR) could have a serious impact on the times and conditions for cabling installation, moves, adds and changes as well as restrictions on removing ceiling tiles, wall penetrations and access to unoccupied spaces. Prior to installation or modifications in any occupied area, the facility ICR should be consulted. Telecommunications spaces that are subject to ICR should be labeled to indicate that ICR measures may be necessary prior to entry.
- Certain cabling products from some areas of healthcare facilities may require specific and regulated means of disposal. Reusing or relocating cabling products (e.g., patch cords) from certain areas may be restricted due to infection control measures or related concerns.
- Some areas of healthcare facilities may involve high levels of electromagnetic interference (EMI). Some cable assemblies that support data transmission in these areas may require appropriate components, isolation or mitigation to comply with electromagnetic environments.
- Cabling in healthcare facilities may be exposed to high magnetic fields, radiation, high temperature, chemicals, etc. The design, installation methods and products selected should be compatible with the environment and support adequate performance during operation. The location of cabling and spaces should be selected to minimize these effects.
- Healthcare facilities make use of a number of wireless applications. It is recommended that the wireless environment be characterized and understood prior to the design, selection and installation of cabling to make sure of satisfactory operation.

Grounding and Bonding

Grounding and bonding shall meet the requirements of ANSI/TIA-568-C.0. Additional information can be found in IEEE 602: "Recommended Practice for Electrical Systems in Healthcare Facilities."

CABLING TRANSMISSION PERFORMANCE AND TEST REQUIREMENTS

The transmission performance and test requirements of ANSI/TIA-568-C.0, ANSI/TIA-568-C.2 and ANSI/TIA-1152 shall be met.

OBTAINING STANDARDS DOCUMENTS

ANSI/TIA documents may be purchased through the IHS Standards Store (Global Engineering Documents) at 877.413.5184 or global.ihs.com. IEEE documents may be purchased through IEEE, P.O. Box 1331, Piscataway, NJ 08855 or ieee.org. CSA documents may be purchased through the Canadian Standards Association at csa.ca or by calling 416.747.4000.

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